land, and we also import much manure. Our great waste in this direction is our failure to recover the fertilising material from sewage; at present this may be unavoidable, but there are other wastages—loss of manures from our farms—that might be remedied. We are far from blameless in the matter of forestry also. The conservation movement is attracting attention in Canada, and it will, let us hope, become a power there and also in the other dominions beyond the seas. First of all, however, the great educational crusade must come to impress upon the present generation that our patrimony is not to be squandered but to be used wisely, and handed on to our descendants in as good a condition as possible.

E. J. R.

INDIAN WHEAT FOR THF BRITISH MARKET.[1]

THE last seven years have seen a rapid development of the Indian wheat trade with the United Kingdom. For the ten years ending 1902, when our average annual import of wheat and flour was 99 million cwt. from all countries, we received an average of 5 million cwt. from India; for the past seven years, however, our total import has been 114 million cwt. on the average, of which 16 million cwt. have come from India. The increase is due to several causes. Cultivation and irrigation have extended in India; the seasons in the northern provinces have, on the whole, been more favourable since 1903 than they were in the eight years following 1894; there has been a great improvement in the means of communication by ship, railway, and road, and, finally, the rupee has been maintained at the uniform rate of sixteenpence since 1898. For the past seven years the area sown with wheat in India has been more than 26 million acres, or about one-ninth of the world's wheat area (estimated at 240 million acres), and the average yield has been 11·6 bushels, one-eleventh only of the world's output, since this yield is lower than in many other countries. It is chiefly in the Punjab that the increase has taken place, and, as larger areas come under irrigation, this province will assume more and more importance as a producer of the world's food.

Great Britain takes more than 90 per cent. of the Indian exports of wheat, and the conditions obtaining in our markets have therefore to be studied seriously by the Indian producer, or rather by his expert adviser. At present Indian wheat does not come here in the beautifully clean, well-graded state in which Canadian wheat arrives, and it therefore commands a shilling a quarter less price. It is, however, more valuable than English wheat, and usually fetches about 2*s*. 6*d*. a quarter more, chiefly on account of its lower moisture content. The reason for its inferior condition is to be found partly in the circumstances in which the wheat is grown; most of the Indian wheat is grown on small peasant's holdings, and is threshed by being trodden out by bullocks on an earthen threshing-floor, and winnowed by hand in the wind, so that there is some mixing of varieties and a certain amount of dirt naturally gets in. Sir James Wilson states, however, that the wheat as it leaves the farm contains only about 1 per cent. of dirt, whereas when it reaches London the various handlers have contrived to dilute it 6 per cent., so as to increase their profits. It is considered that a revision of the terms of contract would get over this difficulty. The other questions—the mixing of varieties, and the low average yield—are matters for the experiment stations, but it seems probable that they can be satisfactorily dealt with.

NOTES.

THE portrait of Sir William Crookes by Mr. E. A. Walton, to which reference was made in our issue of February 9 (p. 481), was presented to the Royal Society before the ordinary meeting on Thursday last, February 16. In the absence of the treasurer of the fund, Lord Avebury, the presentation was made on behalf of the subscribers by Prof. Meldola, who acknowledged the active cooperation of his colleague, Prof. Pope. The necessary fund was contributed by about 130 Fellows of the society. Sir Archibald Geikie, as president, accepted the portrait on behalf of the society in a graceful speech. Sir William Crookes also expressed his thanks to the subscribers for the honour they had conferred upon him. In the course of his remarks he said that in two years he hoped to celebrate the jubilee of his fellowship, as his election dated from 1863.

SIR JOSEPH LARMOR, secretary of the Royal Society, has been elected a member of Parliament to represent the University of Cambridge, in the seat rendered vacant by the death of Mr. S. H. Butcher. Sir Joseph is Lucasian professor of mathematics in the University, and his election as one of its two parliamentary representatives places in the House of Commons a man of distinguished eminence who should command attention in that assembly, and be able to do something for the development of scientific method in national affairs.

H.R.H. THE DUKE OF CONNAUGHT has been elected president of the Royal Society of Arts.

The British Medical Journal announces that the Fothergillian gold medal of the Medical Society of London, given triennially, has been awarded to Dr. F. W. Mott, F.R.S., for his researches on the nervous system.

AT a meeting of the executive committee of the British Science Guild, held on February 15, it was agreed that the Guild and the British Empire League should dine together, and it is hoped that it may be possible to entertain the Colonial Premiers when they are over for the conference. It was also reported that the Guild's committee on the coordination of charitable effort was in communication with the Social Welfare Association for London to see if it might not be possible for them to work together.

DR. J. C. BRANNER, professor of geology at the Leland Stanford Junior University, California, is starting on April 15, with six assistants, on an expedition to explore the western part of the north coast of Brazil. Its special object will be to determine how far the distribution of Brazilian fauna is affected by the obstruction of the Amazon River. The Government of Brazil has offered the explorers the use of a gunboat.

DR. EDWARD G. JANEWAY, one of the foremost diagnosticians in the United States, died at Summit, New Jersey, on February 10, in his seventieth year. At Bellevue Hospital Medical College, New York, he was professor of pathology and practical anatomy from 1872 to 1879, professor of diseases of the mind and nervous system from 1881 to 1886, and professor of medicine from 1886 to 1892. From 1898 to 1905 he held the chair of medicine at the medical school of New York University. He was health commissioner of New York City from 1875 to 1882.

THE recent death-roll in America includes the name of Dr. Leonard Parker Kinnicutt. He was born in 1854, and spent his student period at the Massachusetts Institute of Technology, the Universities of Heidelberg and Bonn, and Johns Hopkins University, Baltimore. He held a junior post at Harvard from 1880 to 1883, since which year he had been connected with the Worcester Polytechnic Institute as assistant-professor and professor of chemistry successively. His chief work was done as an expert on sewage disposal and water supply, and he had acted as consulting chemist to the Connecticut Sewage Commission.

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[1] Memorandum on Indian Wheat for the British Market. By Sir James Wilson, K.C.S.I., late Financial Commissioner, Punjab. (Agricultural Research Institute, Pusa.)

The Times announces the death of Dr. C. Alexander MacMunn, of Wolverhampton, at fifty-nine years of age. Dr. MacMunn was a member of the Physiological Society, the Marine Biological Association, and other bodies, and he devoted himself largely to research, mostly in physiological chemistry and animal pigments. He published numerous works, some of which were translated into foreign languages, and at the time of his death was engaged on "Outlines of Clinical Chemistry," which was nearing completion.

THE death of Dr. William Williams, an authority on sanitation, is announced in *The Times*. Dr. Williams was president of the Sanitary Inspection Association of South Wales and Monmouthshire, and held public appointments in Glamorgan, including that of school medical officer and director of the County Public Health Laboratory. He was a Fellow of the Society of Medical Officers of Health and the Royal Sanitary Institute, and ex-president of the South Wales branch of the British Medical Association. He delivered the Milroy lectures at the Royal College of Physicians in 1904. He wrote works on sanitation, water supplies, and milk adulteration.

IN pursuance of the powers conferred on them under a section of the Development and Road Improvement Funds Act, 1909, the Development Commissioners have appointed an advisory committee to advise them on applications for advances and schemes for the development and improvement of fisheries. The committee is constituted as follows:—Mr. H. J. Tennant, M.P. (chairman); Dr. A. E. Shipley, F.R.S.; Prof. G. C. Bourne, F.R.S.; Prof. D'Arcy Thompson, C.B.; and Mr. D. H. Lane, formerly Inspector of Irish Fisheries. In addition, the Fishmongers' Company has been asked to nominate a representatie.

ON Tuesday next, February 28, Dr. A. E. H. Tutton will begin a course of three lectures at the Royal Institution on "Crystalline Structure: Mineral, Chemical, and Liquid," and on Saturday, March 4, Sir J. J. Thomson will commence his course of six lectures on "Radiant Energy and Matter." The Friday evening discourse on March 3 will be delivered by Dr. F. A. Dixey, on "Scents of Butterflies"; on March 10 by the Hon. Charles A. Parsons, on "Recent Advances in Turbines"; and on March 17 by Mr. John H. Balfour Browne, on "Water Supply."

SIR WILLIAM H. WHITE, K.C.B., F.R.S., has been awarded the John Fritz medal for 1911, for "notable achievements in naval architecture," by the special board of award appointed by the four leading American societies of engineers—the Civil, Mining, Mechanical, and Electrical. The John Fritz medal is recognised as the highest distinction which American engineers can bestow. It was established in August, 1902, by the professional associates and friends of the engineer and metallurgist whose name it bears. The award of the medal is made on the ground of "notable scientific or industrial achievement," with "no restriction on account of nationality or sex." The first award was made in 1905 to Lord Kelvin. In subsequent years the medal has been given to Alexander Graham Bell, Thomas A. Edison, George Westinghouse, Charles Porter, and Alfred Noble.

THE anniversary meeting of the Geological Society of London was held on Friday, February 17. The officers were appointed as follows:—*President*, Prof. W. W. Watts, F.R.S.; *vice-presidents*, Dr. C. W. Andrews, F.R.S., Mr. Alfred Harker, F.R.S., Dr. J. E. Marr, F.R.S., Prof. W. J. Sollas, F.R.S.; *secretaries*, Prof. E. J. Garwood and Dr. A. Smith Woodward, F.R.S.; *foreign secretary*, Sir Archibald Geikie, K.C.B., president R.S.; *treasurer*, Dr. A. Strahan, F.R.S. The following awards of medals and funds were made:—Wollaston medal, Prof. Waldemar C. Brögger; Murchison medal, Mr. R. H. Tiddeman; Lyell medals, Dr. F. A. Bather and Dr. A. W. Rowe; Bigsby medal, Prof. O. Abel; Wollaston fund, Prof. O. T. Jones; Murchison fund, Mr. E. S. Cobbold; Lyell fund, Dr. C. G. Cullis; Barlow-Jameson fund, Mr. J. F. N. Green. The president delivered his anniversary address, which dealt with the evolutionary aspects of geology, more especially with the mode and order of deposition of the various formations.

AN International Congress of the Applications of Electricity is to be held in Turin, Italy, on September 9–20. This congress, as its title implies, will deal with questions of practical import, so that electrical engineers will be able to participate largely in the discussions. The chief endeavour of the organising committee, which is under the chairmanship of Prof. Luigi Lombardi, has been so to draw up the programme that the congress may be international in character as well as in name. To attain this object, the cooperation of the International Electrotechnical Commission, with its local committees now established in many countries, has been obtained, as well as the assistance of the societies and associations in all countries dealing with electrical matters. With the help of these organisations, official reporters have been selected, and already many assurances have been received that numerous papers will be presented to the congress from all parts of the world. The initiators of the congress are the Italian Electrotechnical Society and the Italian local committee of the commission mentioned above. The congress is under the patronage of H.R.H. the Duke of the Abruzzi, who is the president of the committee of honour, upon which Prof. Elihu Thomson and Colonel Crompton, the president and honorary secretary respectively of the commission, have been elected members. Papers are to be presented in French, English, German, and Italian, and the discussions will be carried on in all these languages. The subjects to be discussed, the attractions which Italy itself presents, both as regards scenery and electrical development, in addition to the fact that the first official meeting of the whole Electrotechnical Commission is to take place in Turin about the same time, is bound to make this congress a memorable occasion in the history of electrical engineering.

WE regret to record the death, on February 8, of Mr. P. D. Scott-Moncrieff, assistant in the Department of Egyptian and Assyrian Antiquities in the British Museum. The cause of death was heart failure, after an operation for appendicitis. Mr. Scott-Moncrieff was educated at Charterhouse School, at St. Andrews University, and at Christ's College, Cambridge. At Cambridge he took the Oriental languages tripos, and in December, 1903, he was appointed to an assistantship in the British Museum. His official duties brought him in contact chiefly with the Egyptian side of his department, and in the winter of 1905 he paid a visit to the Sudan to undertake archæological work for the Sudan Government. In October and November of that year, in conjunction with Mr. J. W. Crowfoot, he cleared out the eighteenth dynasty temple at Wady Halfa, of which he afterwards published an account, with plan and photographs, in the Proceedings of the Society of Biblical Archæology. After finishing his work on the temple, he assisted in arranging the monuments in the newly-founded Egyptian Museum at Khartum. As a result of his work at the British Museum, Mr. Scott-Moncrieff had completed the first part of an official publication of hieroglyphic texts from Egyptian stelæ, which it is hoped will shortly appear. He had devoted considerable study to the archæology of the later periods of Egyptian history, and, as first-fruits of his work, he contributed a critical discussion of Plutarch's treatise "De Iside et Osiride" to the *Journal of Hellenic Studies.* For several years past he was also engaged on an examination of the problems presented by the early developments of Christianity in Egypt. He approached the subject from the archæological side, and, at the time of his death, he had nearly completed the MS. of a volume which he proposed to call "Paganism and Christianity in Egypt." His friends hope that arrangements will be made for the publication of this work in the manner and form which he desired.

THE Maya hieroglyphs still await complete decipherment. Some progress towards their interpretation has recently been made by Mr. W. E. Gates, who describes his methods in part i., vol. vi., of the archæological and ethnological publications of the Peabody Museum. The famous Perez Codex, accidentally discovered about fifty years ago in the Bibliothèque Impériale, Paris, has been reproduced by Prof. de Rosny. But these facsimiles are scarce, expensive, and not easily accessible to students. Mr. Gates has now succeeded in reproducing the hieroglyphs in a form of type, of which examples are given in his paper, and has thus greatly facilitated the study of this obscure series of pictorial documents.

IN his treatise on the people of Hungary, "Ethnographie von Hungarn," published in 1877, Paul Hunfalvy describes a race known as the Ishmaelites, whom he identifies with the Mohammedans. Mr. Leo Wiener, in an article in the number of the *Gypsy Lore Journal* for last October, reviewing the original authorities on which Hunfalvy relied, shows that there is much to be said against this identification. He comes to the conclusion that these people were gypsies, the original name Ishmaelite becoming merged with Saracen, and the latter in its turn giving way to the more popular appellation Cigan, which, by the beginning of the fifteenth century in southern Europe, completely overshadows every other designation of the gypsy race.

THE possibilities of the Tuantepec Isthmus as a rival to Panama are seriously engaging the attention of American geographers. The character of the country, its people, and resources are described in a well-illustrated article, by Miss H. Olsson-Seffer, in the December (1910) issue of the *National Geographic Magazine.* The native Indian tribes are a singularly fine race, and the beauty of their women, dress, and ornaments is remarkable. As the Tuantepec route reduces the distance, as compared with that *via* Panama, to Honolulu by 1273 miles, it may become a serious competitor for traffic between the Atlantic and Pacific Oceans.

To the current number of *Scientia* Signor Rignano contributes an article (in French) on "The Mnemonic Origin and Nature of the Affective Tendencies." The author points out that in every living organism there are physiological systems in a state of rest, which it is always tending to maintain or, when disturbed, to return to. He cites various biological instances showing that, when an organism adapts itself to a changed environment, the altered conditions at once tend to become the "optimum" for that organism. Thus he deduces a basis of memory, a mnemonic origin, for every such optimum, to attain which the organism is always reacting, and subjectively experiences an affective tendency of want, appetite, or desire.

IN the third part of "Zur historischen Biologie der Krankheitserreger," published at Giessen in 1910, Prof. G. Elliot Smith and Dr. M. Armand Ruffer give an account of Pott's disease of the spine in an Egyptian mummy belonging to the time of the twenty-first dynasty about 1000 B.C. The paper is illustrated with two plates, showing a drawing and a photograph of the angular curve of the spine as seen from without and from within the body. The authors claim no novelty in the discovery of a case of Pott's disease in the remains of the ancient Egyptians. They believe it of importance, however, as being the first case which has been thoroughly investigated and proved to be tuberculous in nature, and their case has led to the detection of tubercle as the cause of abnormal conditions found in other bodies since examined. Many ancient Egyptian bodies have shown abnormal curvature of the spine, and some of these have been described as instances of Pott's disease. On examination, however, they have been found to be in reality typical examples of osteoarthritis, or the disease described and illustrated by Dr. Wood Jones under the name of "spondylitis deformans." This disease was extremely widespread in upper Egypt, particularly in the predynastic age, so much so that signs of it are to be seen in practically every body raised from a common burial ground of that time. This disease was also widespread in the time of the Persian dynasties, about 525–332 B.C., and in lower Egypt the skeletons of Macedonian soldiers and their families frequently show unmistakable signs of spondylitis deformans. The mummy described by the present authors shows a very typical angular curvature of the spine, while the interior of the body shows the remains of a psoas abscess, a very frequent complication of tuberculous disease of the spine at the present day.

AN illustrated account, by Mr. W. H. Mullens, of the two Tradescants and the famous Tradescant Museum—which once contained the whole skin of a dodo—forms the first article in Witherby's *British Birds* for February.

VOL. vii., No. 2, of the Zoological Publications of the University of California is devoted to an account of the birds and mammals collected during the Alexander expedition to Alaska in 1909, two rodents being described as new.

THE fifteenth instalment of the report on the zoological results of Dr. Franz Werner's expedition to the Egyptian Sudan and northern Uganda in 1904 appears in vol. cxix., part vi., of *Sitzber. Acad. Wissenschaften,* Vienna. In this contribution Dr. E. von Daday commences an account of the microfauna of the Nile and its tributaries, as exemplified by plankton collected by the travellei at a large number of localities, but actually deals only with the Egyptian forms. Many of these have been previously identified in other parts of Africa, but half-a-dozen crustaceans are described as new.

THE Biological Survey Division of the U.S. Department of Agriculture has issued (as Bulletin No. 36) an illustrated pamphlet on the practicability and possibilities of breeding deer and other big game in confinement in the United States in such a manner as would make the experiment remunerative. The author, Mr. D. E. Lantz, states that, were it not for prohibitive laws, there would be a large and constant demand for venison in the country, and that it could be placed on the market at a lower price than beef, owing to the facility with which deer can make a living on poor pasture. Both the wapiti and the white-tailed deer are rapidly diminishing in numbers, and since both kinds can be easily tamed and bred in confinement, there is every inducement for trying the experiment, which, if successful, would prove a lasting benefit. For a time, the rearing of both species for stocking parks ought to be more profitable than the sale of the venison. Schemes for domesticating the caribou and the moose as beasts of draught, as well as for introducing Indian and African antelopes into the United States, are likewise mooted.

THE Journal of the College of Science of the Imperial University of Tokio (vol. xxvii., article 17) contains an interesting account by N. Yatsu of his experiments on germinal localisation in the egg of Cerebratulus. These experiments afford a typical illustration of the manner in which experimental methods are now being applied to the study of animal development. Ovisection in various planes, and separation or dislocation of the blastomeres by mechanical or chemical means are employed, and though the results obtained cannot, perhaps, be regarded as very definite, they are certainly very suggestive. The author concludes that the egg contains "organ bases," but that these have no hard and fast lines of boundary between them; still, there is "something" for each larval organ. He also concludes that there must be a regulating "factor" which in some way brings back shifted blastomeres to the normal position, or, at any rate, to such a position that they are able to produce a larva which differs but little from the normal.

THE problem of sex-determination is just now receiving a good deal of attention from students of heredity, and an interesting controversy has arisen with regard to the Mendelian interpretation of sex ratios. Russo maintains that he is able to alter the proportion of the sexes in the case of rabbits by injecting lecithin into the female parent before the eggs have arrived at maturity. Two kinds of eggs are said to occur in the ovary, one of an anabolic or constructive type, containing globules of lecithin, and the other of a katabolic type, containing crystals of acid fat. The former are believed to give rise to females and the latter to males, and the injection of lecithin into the parent increases the proportion of females. Russo's results have been criticised by Punnett, and more recently by Castle (*American Naturalist*, July, 1910), and Russo replies in the *Biologisches Centralblatt* (January 1, 1911). He points out that Punnett, in repeating the experiment, only administered the lecithin by the mouth of the rabbit, instead of by injection, and that it is decomposed in the alimentary canal. It is obviously very important that Russo's experiments should be repeated by an impartial observer, and that the methods employed by him should be strictly followed.

A CATALOGUE of botanical books, chiefly secondhand, comprising floras of all countries, has been recently published by Messrs. John Wheldon and Co., Great Queen Street, London. The fullest sections are those enumerating general and local British floras, and systematic publications dealing with the plants of India, North and South America, and Australasia.

THE fifth number of last year's botanical volume of the *Philippine Journal of Science* contains the conclusion of the article, by Mr. E. D. Merrill and Mr. M. L. Merritt, on the flora of Mt. Pulog, and a revision of the Philippine Piperaceæ, by Dr. C. de Candolle. The latter paper raises the total number of Piperaceæ known to exist in the Philippines from thirty to one hundred and twenty-five, all referable to the two genera Piper and Peperomia.

Two articles on the subject of pansies and violas, published in the Journal of the Royal Horticultural Society (vol. xxxvi., part ii.), cannot fail to interest growers, as they are contributed by Mr. J. Grieve and Mr. Wm. Cuthbertson, experts of many years' standing. Mr. Grieve explains that he originated his violas by applying pollen from "show pansies" to the stigma of wild species, *V. lutea*, *V. cornuta*, *V. stricta*, and *V. amoena*; the reverse cross did not give any good results. Hints on culture are supplied by Mr. Cuthbertson, who remarks that many of the best varieties raised years ago still continue to maintain their position.

SOME historical notes, compiled by Mr. H. B. Watt, with reference to early tree planting in Scotland appear in the *Glasgow Naturalist* (vol. iii., No. 1). The introduction of fruit-bearing trees during the period of Roman occupation, and plantations round monasteries and ecclesiastical establishments, are suggested as the earliest beginnings. Historical references date from the fifteenth century, and the first plantations at Inveraray appear to have been about the year 1600. Evidence for computing the ages of the oldest trees, chestnuts, sycamores, and beeches, is presented; the Kippenross sycamore and Corstorphine "plane" are referred to the fifteenth century. A list of trees enumerates twenty native and fifty introduced species.

IN many countries at the present time the detailed investigation of their geographical conditions attracts as much attention as the study of distant lands, and has the advantage of being based on much fuller and more accurate information; moreover, the period over which such data are spread enables comparisons to be made between the conditions which existed at different periods. In the December (1910) number of *Petermann's Mitteilungen* Prof. H. Hassinger presents a brief study of the geography of towns and cities, indicating in a systematic manner the lines of investigation which may be followed in order to show the influence that their surrounding and the requirements of the population have had on their development. Dr. Maull in the same number discusses a more localised subject, the zone of the northern limestone Alps, and traces the settlements and lines of communication as they occur in forest belt and neighbouring region, as well as their gradual development. A more specialised type of study is that of Dr. K. Schneider (*Mitt. k.k. Geog. Gesell. Wien*, Nos. 11, 12, 1910), wherein he discusses at some length the geographical relations of the German and Czech peoples in Bohemia, the development of towns and cities, communications, and commercial intercourse.

THE meteorology of the future is the subject of an instructive lecture delivered some time since by Prof. C. Abbe at Columbia University, and printed in the *Popular Science Monthly* for January. The author admits that the question is a very difficult one, and that it is impossible to foresee in detail the problems of the future. Long ago mariners took advantage of the knowledge of trade winds and monsoons, but it took two more centuries to acquire a knowledge of whirlwinds as they advance over the globe, and we are not yet able to speak of weather forecasts as more than probabilities. Some very interesting experiments were arranged, illustrating the formation of cloud and rain, and, with reference to ineffectual attempts made in some countries, it was shown that if we wish to avert rain or hail, we must be able to cut off the supply of moisture, or prevent rapid expansion. The most important problem at the present time, and in future, will be to attain a clear idea of the mechanics of the atmosphere as a whole, comprised under the technical terms hydromechanics, aëro- and thermo-dynamics, and another century may elapse before all these questions can be solved. When meteorology has become more truly deductive, the author further remarks, then we can pass to the satisfactory discussion of the great problems that we now can merely toy with.

IN an address delivered on December 29, 1910, as retiring vice-president of Section B (Physics) of the American Association for the Advancement of Science, Dr. L. A. Bauer deals with some problems of terrestrial magnetism, especially with the question whether the sudden commencements of magnetic storms are simultaneous in occurrence at different places. The views which he expresses on this subject are similar to those already given by him in NATURE. Dr. Bauer also refers to a different type of storm having effects appreciable over only limited areas, but does not say explicitly whether the type is essentially different from the "polar elementary" storms described by Prof. Birkeland in the Arctic or the "special type of disturbance" recorded in 1902–3 in the Antarctic. Towards the end of his address, Dr. Bauer states that modern researches point to the conclusion that attempts to represent the earth's magnetic field by a Gaussian potential are of doubtful value, owing to the enormous number of Gaussian constants required to represent anything beyond the more general features.

THE annual report of the council of the Institution of Mechanical Engineers for the year 1910, which was adopted at the general meeting on February 17, deals with the chief directions of the progress and work of the institution. The work of the alloys research committee has been continued at the National Physical Laboratory, and it is expected that the tenth report will be presented for discussion during the current session. It will deal with the binary system of alloys of aluminium-zinc, together with some preliminary results obtained in a ternary system of aluminium-zinc-copper, the quantity of copper being limited in amount. The work of the gas-engine research committee has been continued at the University of Birmingham, and Prof. F. W. Burstall is preparing a report dealing with a new series of tests on the experimental engine at the University, varying only the ratio of air to gas, dealing also with the composition of the charge during expansion. Prof. H. C. H. Carpenter has concluded his research, referred to in the 1907 report, upon the production of castings to withstand high pressures. Of the remaining researches in the hands of special committees, that on the value of the steam-jacket is in abeyance at present, while that on the friction of various gears is awaiting the publication of the results of some experiments in the United States. It has been decided not to undertake experiments on "heat transmission" at present.

IN the November (1910) number of the Bulletin of the Bureau of Standards Mr. B. McCollum describes and investigates the theory of a new form of dynamometer for the measurement of the quantity of electricity which flows through the instrument. It consists of a relatively large fixed coil with its axis horizontal, at the centre of which is suspended, by a long vertical wire, a smaller coil with its axis parallel to that of the larger coil. Attached to the moving coil is a cylinder of some homogeneous material with its axis coincident with that of the suspension. When the current is sent round the coils, a magnetic couple acts on the moving coil, tending to hold it with its axis parallel to that of the fixed coil, and if the moving coil is displaced it will oscillate about its axis of suspension. The quantity of electricity which passes through the coils during n swings of the coil is equal to

$$2\pi n\sqrt{K(1-T^2/T_0^2)}/C,$$

where K is the moment of inertia of the moving system, T the time of swing with, T_0 the time without the current, and C is the constant of the coils which can be calculated from their dimensions. The investigations of the author appear to promise a degree of accuracy in the measurements comparable with that of the current balance.

The Central of January contains an article on "Crystal Structure and Chemical Composition" from the pen of Prof. W. J. Pope, F.R.S. It is no exaggeration to say that the theory which has been so admirably developed in recent years by Mr. Barlow and Prof. Pope is likely to prove equal in value with the work of Pasteur, van 't Hoff, and Le Bel, which culminated in the enunciation of the theory of the tetrahedral arrangement of the valencies of the carbon atom. The systems of close-packed spheres devised by Messrs. Barlow and Pope certainly give a more realistic picture of the actual arrangement of the atoms in the molecules of a crystal than the wide-spreading models which are commonly used to represent the tetrahedral theory, although the latter are of greater service in interpreting the chemical changes which the molecules may undergo. The widespread appreciation of the new theories of crystal structure has been hindered by the scanty distribution of crystallographic knowledge and by the difficulty of visualising the diagrams by which its essential features are expressed; a popular and simple exposition of his views by one of the authors of the theory is therefore doubly welcome. The same issue contains articles by Prof. Dalby on "The New Engineering Laboratories of the Central Technical College," by Mr. Tripp on "Cross-Channel Steamers," by Mr. Branch on "The Bonus System in a Machine Shop," and by Mr. Montgomery on "The Development of the Humphrey Pump."

THE Silica Syndicate, Ltd., 82 Hatton Garden, London, E.C., has issued an illustrated descriptive catalogue of its transparent quartz-glass apparatus. Transparent quartz glass does not crack on subjection to violent and sudden changes of temperature. Its melting point is indefinite, but may be taken at about 1600° C.; there is, however, no trace of fusion at 1555° C. Above 1000° C. it is permeable to hydrogen. Its expansion up to 1000° C. is regular; above 1100° C. it contracts. The catalogue gives particulars of the numerous pieces of apparatus obtainable in this useful material, together with the current prices.

BULLETIN No. 43 of the University of Illinois contains an account, by Prof. E. C. Schmidt, of experiments on freight-train resistance and its relation to average car weight. The tests were conducted by the Railway Engineering Department of the University of Illinois in 1908 and 1909; all were made by means of a dynamometer car owned jointly by the University and the Illinois Central Railroad, and were carried out on the Chicago division of this road. Results of tests on thirty-two ordinary freight trains are discussed; the average weight per car ranged from a minimum of 16·12 tons to a maximum of 69·92 tons, and the number of cars in the train varied from twenty-six up to eighty-nine. The results may be expressed by an equation

$$R = a + bS + cS^2,$$

in which the coefficients a, b, and c depend on the average weight W of the cars in the train in tons; S is the speed in miles per hour, and R is the resistance in pounds per ton weight. A table of values of the coefficients is given for values of W from 15 tons up to 75 tons. This formula shows a maximum error of half of 1 per cent. when compared with the experimental results. Another empirical formula is given which has a maximum error of 9·5 per cent., viz.

$$R = \frac{S + 39{\cdot}6 - 0{\cdot}031\ W}{4{\cdot}08 + 0{\cdot}152\ W}.$$

The formulæ are limited to conditions similar to those prevailing during the trials, viz. straight and level track of good construction, temperature above 30° F., wind velocity not more than 20 miles per hour.

In our notice of the fourth edition of "Les Roches et leurs Eléments minéralogiques," by the late M. Ed. Jannettaz, in December last (vol. lxxxv., p. 166), we complained of the description of the work as a revised and enlarged edition (Quatrième édition, revue et augmentée). We have now to acknowledge the receipt from the publishers, MM. Hermann et Fils, Paris, of another copy with modified cover and title-page, in which it is now described correctly as "Quatrième édition, conforme à la Troisième et augmentée de huit planches." The publishers assure us they had no intention of misleading purchasers by the wording of the former description. The work has at least the merit of cheapness, the price being only eight francs.

We have received from the Board of Agriculture and Fisheries a memoir of the Geological Survey, Scotland, entitled "Catalogue of Photographs of Geological Subjects," which has been prepared by the Geological Survey and Museum. The catalogue enumerates the first 1913 photographs taken to illustrate subjects of geological interest in Scotland. The number, subject, and locality of each photograph are given, and the number of the 1-inch map in which each locality occurs. The districts illustrated lie chiefly in the north-west Highlands, Skye, in the counties of Argyll, Perth, Aberdeen, Kincardine, Fife, Haddington, and Mid-Lothian. Copies of the catalogue, price 6*d*., can be obtained from any agents for the sale of Ordnance Survey maps, or through any bookseller.

OUR ASTRONOMICAL COLUMN.

Nova Lacertæ.—*L'Astronomie* for February contains a number of observations of Nova Lacertæ, and includes a reproduction of a spectrogram secured by Dr. Max Wolf, at Heidelberg, on January 2. In addition to the broad bright hydrogen lines, the outstanding features are the band at λ 463, several emission lines between Hβ and Hγ, a conspicuous break in the continuous spectrum on the more refrangible side of Hγ, and the strong emission line near λ 4056.

Nova Sagittarii, No. 3, H.V. 3306.—While examining a plate taken at Arequipa on September 6, 1899, with the 1-inch Cooke lens, Miss Cannon found a star image which appeared to be that of a nova in the position (1900) R.A. = 18h. 13m. 47·5s., dec. = −25° 13·5′; this is about 1′ north of the C.D.M. tenth-magnitude star −25° 13020.

The customary investigation of past plates revealed the fact that the light-curve of the star had the characteristics of the curves of novæ. A large number of photographs were examined covering the period June 7, 1889, to September 3, 1910, and many of them showed no trace of the nova. On plates taken on August 5, 6, 7, and 9, 1899, it is not shown, although the last-named shows a neighbouring star of magnitude 11·4, yet the photograph of August 10, 1899 (G.M.T. 12h. 28m.), shows it at full brightness, viz. magnitude 8·5; this photograph was taken with the 13-inch Boyden telescope, the exposure being 100m. Seven plates, taken for the cluster N.G.C. 6266, show a star of magnitude 15·6 in the position of the nova, within the limits of measurement, but this object exhibits no variability on five earlier plates or on five plates taken since 1905. Since August 10, 1899, the nova has appeared on twenty-six plates taken with various instruments at Cambridge (Mass.), and Arequipa, and on the last of these, taken on October 3, 1901, its magnitude was 13·3. The light-curve shows that the brightness decreased rapidly at first, but was nearly stationary, at magnitude 12·0, from April to July, 1900. A plate accompanying Circular 183 of the Harvard College Observatory reproduces the photographs of the nova's region taken on August 3 and 10, 1899.

The Satellites of Mars.—Observations of Phobos and Deimos during the opposition of 1909 are recorded by Prof. Lowell in No. 50 of the Lowell Observatory Bulletins. Several interesting observations relating to the apparent magnitudes of the two satellites are described, Phobos generally appearing the brighter. Thus on September 16, 1909, it was half a magnitude brighter than Deimos, although with reduced apertures—6 inches being the limit—it was the fainter.

From a discussion of the data obtained, Prof. Lowell finds that Phobos is probably 2·48 times the diameter of Deimos, has 6·15 times the visible surface, and, if the densities are equal, has 15·25 times the mass. The data are too meagre to give a definite conclusion, but, so far as they go, they suggest that there is a difference of brilliancy in one, or both, of the satellites, dependent on their orbital positions; this suggests that each satellite has different local albedoes, or an irregularity of shape, and that it always keeps the same face towards Mars.

The Spectra of some Wolf-Rayet Stars.—Bulletin No. 182 of the Lick Observatory contains a note by Mr. J. C. Duncan describing the spectra of seven Wolf-Royet stars photographed by him, with the one-prism spectrograph mounted on the 36-inch refractor, during the summer of 1908.

Many of the lines and bands shown on these photographs exhibit no notable differences from those published by Prof. Campbell in 1894, but those given in the following table did not appear in the earlier publication:—

λ of centre of line or band	Star B.D. °	Description of line or band
4120·84	+35·3953	Narrow dark line
4068·40	+30·3639	,, bright ,,
4630	+36·3956	,, faint band
4058	+36·3987	Fairly bright band 15 A.U. wide
4099	+36·3987	,, ,, 34 ,,
4628	+36·3987	Faint band 54 A.U. wide
4056	+37·3821	,, ,,

Southern Nebulæ.—Two notes describing remarkable southern nebulæ appear in No. 5 of the Transvaal Observatory Circulars.

The first deals with a great ring nebula in Aquarius (N.G.C. 7293, Harding; 22h. 23m., −21° 26′), which is nearly circular and has a diameter of 11′. Mr. Innes describes it as a remarkable object, looking like a ring nebula superimposed on a planetary nebula, and states that it was first seen in the 2-inch finder. This points to the description "very faint" in the N.G.C. being incorrect, or the nebula is variable; it is difficult to account for its being missed, with its present brightness, by Messier and the Herschels. From a photograph taken on October 4, 1910, with 60m. exposure, Mr. Woods describes the nebula as a broad, continuous ring extending across 52s. in R.A. and 12·6′ in declination, and appearing slightly fainter in 135° and 315° than at other parts.

The second object was discovered on a plate taken by Mr. Mitchell on August 1, 1910, with the Franklin-Adams star camera, with an exposure of 2 hours. This is a large, irregular nebula, around and preceding π Scorpionis, which is not mentioned in any of Dreyer's three catalogues. Its position is 15h. 53m., −25° 50′, and it extends over 1° in a north and south direction, its other diameter being about ½°.

A Slowly Moving Meteor.—A fairly bright meteor, remarkable for the leisurely rate at which it moved, was seen by Mr. F. E. Baxandall, at Putney, at 9 p.m. on February 19. It first appeared in about 169°, +39°, and, travelling very slowly, passed through 211°, +28°, finally disappearing below the north-east horizon after a flight lasting fully 15 seconds.